



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 24, 2025 – 02:19 AM JST

PDB ID : 5XIK / pdb_00005xik
Title : Crystal Structure of Toxoplasma gondii Prolyl-tRNA Synthetase (TgPRS) in complex with tetrahydro quinazolinone febrifugine
Authors : Jain, V.; Manickam, Y.; Sharma, A.
Deposited on : 2017-04-26
Resolution : 2.50 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.42

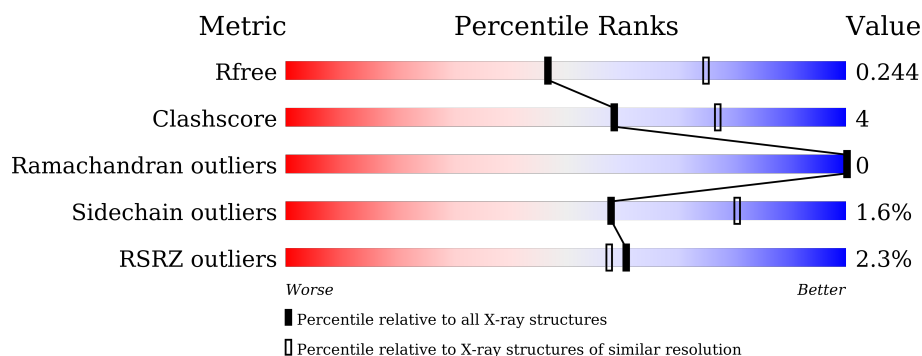
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	5504 (2.50-2.50)
Clashscore	180529	6282 (2.50-2.50)
Ramachandran outliers	177936	6191 (2.50-2.50)
Sidechain outliers	177891	6193 (2.50-2.50)
RSRZ outliers	164620	5504 (2.50-2.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	500	<div> <div>2%</div> <div> <div></div> <div>86%</div> <div>7%</div> <div>• 5%</div> </div> </div>
1	B	500	<div> <div>2%</div> <div> <div></div> <div>83%</div> <div>10%</div> <div>• 6%</div> </div> </div>
1	C	500	<div> <div>2%</div> <div> <div></div> <div>85%</div> <div>9%</div> <div>6%</div> </div> </div>
1	D	500	<div> <div>3%</div> <div> <div></div> <div>83%</div> <div>11%</div> <div>• 6%</div> </div> </div>

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 15726 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

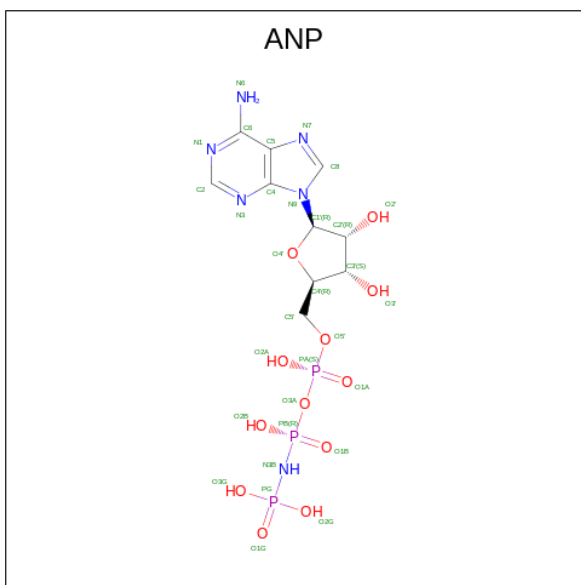
- Molecule 1 is a protein called Prolyl-tRNA synthetase (ProRS).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	476	Total	C	N	O	S	0	0	0
			3874	2490	665	697	22			
1	B	469	Total	C	N	O	S	0	1	0
			3782	2431	652	678	21			
1	C	471	Total	C	N	O	S	0	0	0
			3823	2457	655	690	21			
1	D	472	Total	C	N	O	S	0	0	0
			3809	2446	654	688	21			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	331	GLY	-	expression tag	UNP S8G8I1
A	332	ALA	-	expression tag	UNP S8G8I1
A	333	MET	-	expression tag	UNP S8G8I1
B	331	GLY	-	expression tag	UNP S8G8I1
B	332	ALA	-	expression tag	UNP S8G8I1
B	333	MET	-	expression tag	UNP S8G8I1
C	331	GLY	-	expression tag	UNP S8G8I1
C	332	ALA	-	expression tag	UNP S8G8I1
C	333	MET	-	expression tag	UNP S8G8I1
D	331	GLY	-	expression tag	UNP S8G8I1
D	332	ALA	-	expression tag	UNP S8G8I1
D	333	MET	-	expression tag	UNP S8G8I1

- Molecule 2 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (CCD ID: ANP) (formula: C₁₀H₁₇N₆O₁₂P₃).

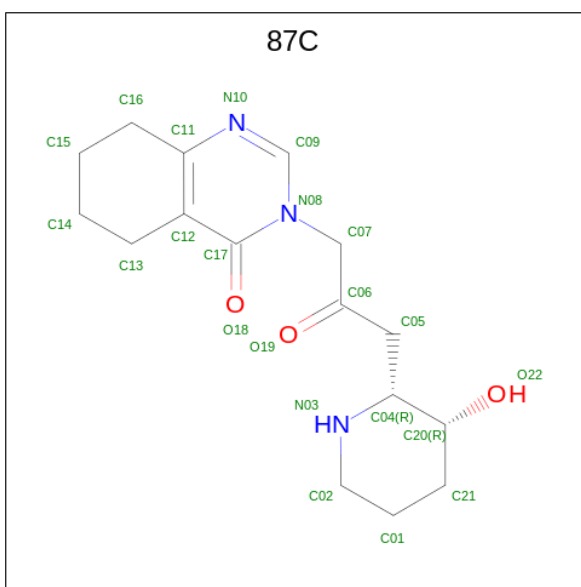


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			31	10	6	12	3		
2	B	1	Total	C	N	O	P	0	0
			31	10	6	12	3		
2	C	1	Total	C	N	O	P	0	0
			31	10	6	12	3		
2	D	1	Total	C	N	O	P	0	0
			31	10	6	12	3		

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	Mg	0	0
			2	2		
3	B	2	Total	Mg	0	0
			2	2		
3	C	2	Total	Mg	0	0
			2	2		
3	D	2	Total	Mg	0	0
			2	2		

- Molecule 4 is 3-[2-oxidanylidene-3-[(2R,3R)-3-oxidanylpiperidin-2-yl]propyl]-5,6,7,8-tetrahydroquinazolin-4-one (CCD ID: 87C) (formula: C₁₆H₂₃N₃O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			22	16	3	3		
4	B	1	Total	C	N	O	0	0
			22	16	3	3		
4	C	1	Total	C	N	O	0	0
			22	16	3	3		
4	D	1	Total	C	N	O	0	0
			22	16	3	3		

- Molecule 5 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Cl	0	0
			1	1		
5	C	1	Total	Cl	0	0
			1	1		
5	D	2	Total	Cl	0	0
			2	2		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	75	Total	O	0	4
			79	79		
6	B	37	Total	O	0	1
			38	38		

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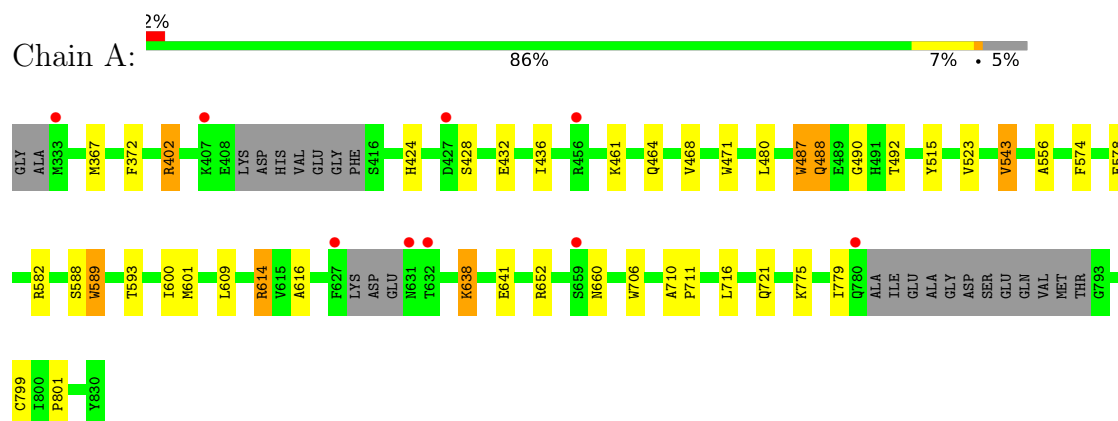
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	41	Total 43	O 43	0	2
6	D	53	Total 54	O 54	0	1

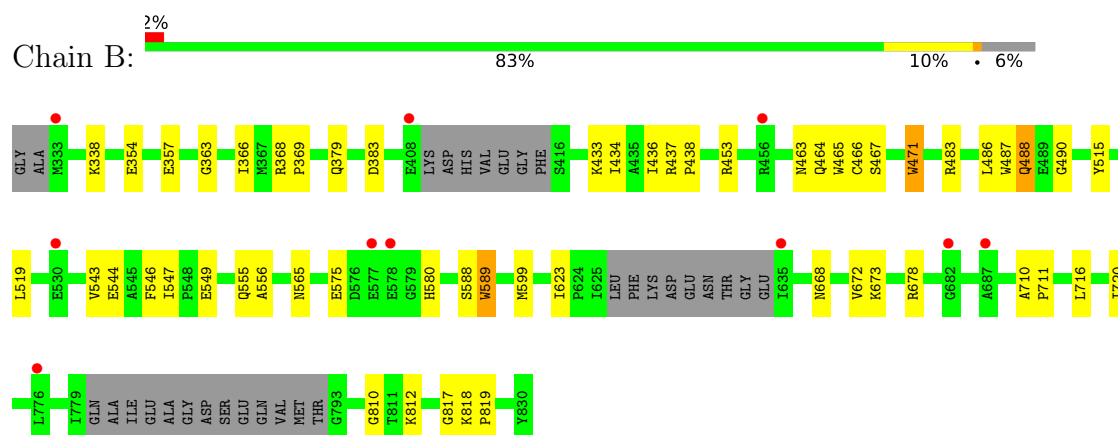
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

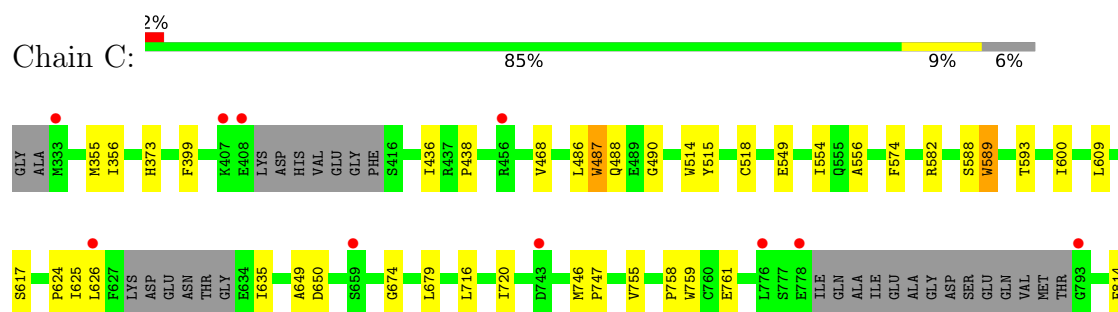
• Molecule 1: Prolyl-tRNA synthetase (ProRS)

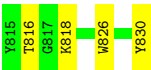


• Molecule 1: Prolyl-tRNA synthetase (ProRS)

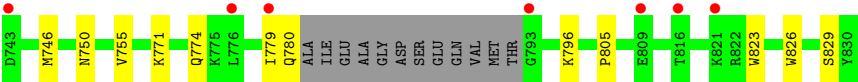
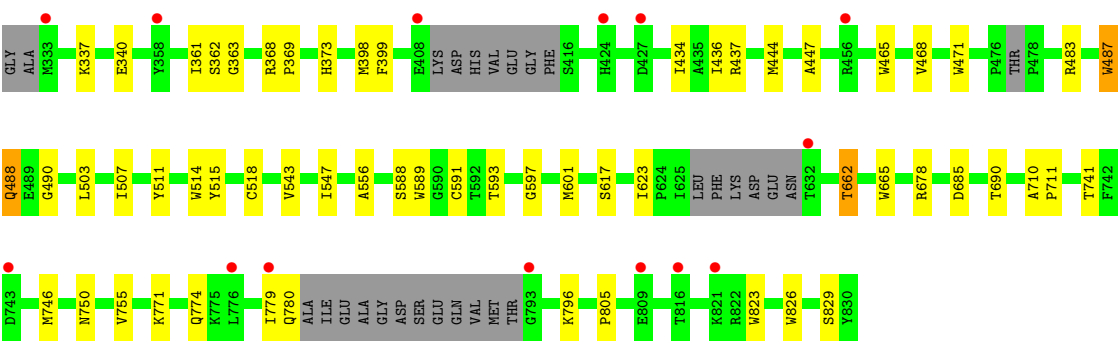
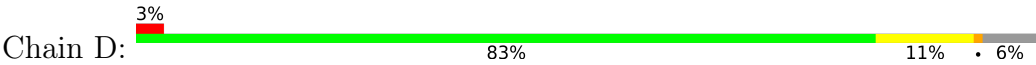


• Molecule 1: Prolyl-tRNA synthetase (ProRS)





● Molecule 1: Prolyl-tRNA synthetase (ProRS)



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	76.64Å 90.14Å 93.20Å 89.46° 80.34° 76.07°	Depositor
Resolution (Å)	43.76 – 2.50 43.76 – 2.50	Depositor EDS
% Data completeness (in resolution range)	96.6 (43.76-2.50) 96.6 (43.76-2.50)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.66 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.185 , 0.244 0.193 , 0.244	Depositor DCC
R_{free} test set	4115 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	36.5	Xtriage
Anisotropy	0.046	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 36.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	15726	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.39% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 87C, CL, MG, ANP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.78	0/3978	0.84	0/5379
1	B	0.71	0/3887	0.81	0/5264
1	C	0.73	0/3927	0.80	0/5316
1	D	0.75	0/3911	0.83	0/5293
All	All	0.74	0/15703	0.82	0/21252

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3874	0	3820	30	0
1	B	3782	0	3708	35	0
1	C	3823	0	3746	33	0
1	D	3809	0	3719	33	0
2	A	31	0	13	0	0
2	B	31	0	13	2	0
2	C	31	0	13	0	0
2	D	31	0	13	0	0
3	A	2	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	22	0	0	0	0
4	B	22	0	0	0	0
4	C	22	0	0	0	0
4	D	22	0	0	1	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
5	D	2	0	0	0	0
6	A	79	0	0	0	0
6	B	38	0	0	1	0
6	C	43	0	0	0	0
6	D	54	0	0	1	0
All	All	15726	0	15045	131	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (131) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:746:MET:O	1:D:750:ASN:ND2	2.10	0.84
1:C:624:PRO:HB2	1:C:626:LEU:HD13	1.58	0.83
1:A:436:ILE:HD11	1:B:436:ILE:HD11	1.61	0.82
1:B:543:VAL:HG23	1:B:556:ALA:HB3	1.69	0.75
1:A:614:ARG:HG3	1:A:721:GLN:NE2	2.04	0.73
1:A:614:ARG:HG3	1:A:721:GLN:CD	2.14	0.68
1:A:543:VAL:HG13	1:A:556:ALA:HB3	1.76	0.67
1:C:716:LEU:O	1:C:720:ILE:HG13	1.94	0.66
1:D:362:SER:O	1:D:483:ARG:HD2	1.96	0.64
1:B:471:TRP:HA	1:B:483:ARG:HD3	1.80	0.64
1:C:816:THR:HB	1:C:818:LYS:HD3	1.79	0.63
1:D:398:MET:CE	1:D:436:ILE:HG23	2.30	0.62
1:B:368:ARG:HB3	1:B:369:PRO:HD2	1.82	0.62
1:A:515:TYR:CZ	1:A:556:ALA:HB1	2.35	0.61
1:C:515:TYR:CZ	1:C:556:ALA:HB1	2.40	0.57
1:A:515:TYR:CE2	1:A:556:ALA:HB1	2.40	0.57
1:D:437:ARG:HD3	6:D:1108:HOH:O	2.05	0.56
1:D:337:LYS:HB2	1:D:340:GLU:HB2	1.87	0.56
1:B:565:ASN:HB2	6:B:1119:HOH:O	2.06	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:480:LEU:HD11	1:A:601:MET:CE	2.37	0.54
1:C:626:LEU:HD11	1:C:635:ILE:HG21	1.90	0.54
1:B:519:LEU:HD22	1:B:599:MET:HE2	1.90	0.53
1:C:373:HIS:CG	1:C:617:SER:HB3	2.42	0.53
1:C:626:LEU:HD11	1:C:635:ILE:HD13	1.90	0.53
1:B:716:LEU:O	1:B:720:ILE:HG12	2.08	0.53
1:C:514:TRP:O	1:C:518:CYS:HB2	2.09	0.53
1:D:515:TYR:CZ	1:D:556:ALA:HB1	2.44	0.53
1:B:515:TYR:CZ	1:B:556:ALA:HB1	2.44	0.52
1:B:549:GLU:N	1:B:549:GLU:OE1	2.41	0.52
4:D:1004:87C:N03	4:D:1004:87C:O19	2.42	0.52
1:C:755:VAL:HG22	1:C:826:TRP:HB2	1.91	0.52
1:B:463:ASN:OD1	1:B:488:GLN:HG2	2.10	0.51
1:C:625:ILE:C	1:C:626:LEU:HD12	2.30	0.51
1:A:487:TRP:C	1:A:487:TRP:CD1	2.84	0.50
1:C:490:GLY:O	1:C:588:SER:HA	2.11	0.50
1:A:600:ILE:HG23	1:A:609:LEU:CD2	2.42	0.50
1:A:638:LYS:HE2	1:A:706:TRP:CZ3	2.47	0.50
1:A:490:GLY:O	1:A:588:SER:HA	2.12	0.50
1:B:668:ASN:O	1:B:672:VAL:HG23	2.12	0.50
1:B:436:ILE:O	1:B:438:PRO:HD3	2.11	0.49
1:A:588:SER:C	1:A:589:TRP:CD1	2.86	0.49
1:A:775:LYS:O	1:A:779:ILE:HD13	2.13	0.49
1:D:662:THR:HG23	1:D:665:TRP:HB2	1.95	0.49
1:D:796:LYS:HE2	1:D:829:SER:OG	2.13	0.49
1:C:626:LEU:HD11	1:C:635:ILE:CD1	2.43	0.48
1:B:623:ILE:HD12	1:B:678:ARG:HD2	1.95	0.48
2:B:1001:ANP:H8	2:B:1001:ANP:H3'	1.95	0.48
1:D:710:ALA:HB3	1:D:711:PRO:CD	2.43	0.48
1:C:625:ILE:O	1:C:626:LEU:HD12	2.14	0.48
1:A:424:HIS:HB2	1:A:428:SER:O	2.14	0.48
1:B:710:ALA:HB3	1:B:711:PRO:HD3	1.95	0.47
1:A:468:VAL:HG21	1:A:487:TRP:CE2	2.48	0.47
1:B:467:SER:HB3	1:B:486:LEU:HD23	1.95	0.47
1:C:649:ALA:O	1:C:650:ASP:HB2	2.13	0.47
1:D:398:MET:HE2	1:D:436:ILE:HG23	1.96	0.47
1:D:623:ILE:HD12	1:D:678:ARG:HD2	1.96	0.47
1:C:758:PRO:HD2	1:C:814:PHE:HB3	1.97	0.46
1:C:515:TYR:CE2	1:C:556:ALA:HB1	2.50	0.46
1:D:399:PHE:HB3	1:D:434:ILE:CG2	2.46	0.46
1:D:597:GLY:O	1:D:601:MET:HG3	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:710:ALA:HB3	1:D:711:PRO:HD3	1.97	0.46
1:C:626:LEU:CD1	1:C:635:ILE:HD13	2.46	0.46
1:B:437:ARG:O	1:B:437:ARG:HG2	2.16	0.46
1:B:810:GLY:O	1:B:812:LYS:NZ	2.48	0.46
1:D:755:VAL:CG2	1:D:826:TRP:HB2	2.46	0.46
1:A:710:ALA:HB3	1:A:711:PRO:CD	2.47	0.45
1:C:436:ILE:O	1:C:438:PRO:HD3	2.17	0.45
1:D:490:GLY:O	1:D:588:SER:HA	2.16	0.45
1:D:468:VAL:HG21	1:D:487:TRP:CE2	2.51	0.45
1:A:402:ARG:NH1	1:A:432:GLU:OE2	2.50	0.45
1:A:574:PHE:CE1	1:A:582:ARG:HB2	2.51	0.45
1:A:600:ILE:HG23	1:A:609:LEU:HD22	1.98	0.45
1:B:588:SER:C	1:B:589:TRP:CD1	2.89	0.45
1:C:399:PHE:HB3	1:D:361:ILE:HD13	1.98	0.45
1:B:363:GLY:HA3	1:B:483:ARG:HG3	1.99	0.45
1:D:368:ARG:HB3	1:D:369:PRO:HD2	1.99	0.45
1:D:444:MET:O	1:D:447:ALA:HB3	2.17	0.45
1:D:514:TRP:O	1:D:518:CYS:HB2	2.17	0.44
1:D:363:GLY:HA3	1:D:483:ARG:HG3	2.00	0.44
1:D:465:TRP:CE3	1:D:488:GLN:HB2	2.52	0.44
1:D:685:ASP:HB3	1:D:690:THR:O	2.18	0.44
1:D:755:VAL:HG22	1:D:826:TRP:HB2	1.99	0.44
1:A:616:ALA:O	1:A:652:ARG:NH2	2.47	0.44
1:B:490:GLY:O	1:B:588:SER:HA	2.18	0.44
1:C:468:VAL:HG21	1:C:487:TRP:CE2	2.53	0.44
1:C:626:LEU:CD1	1:C:635:ILE:HG21	2.48	0.44
1:C:609:LEU:O	1:C:674:GLY:HA2	2.18	0.43
1:A:436:ILE:HD11	1:B:436:ILE:CD1	2.41	0.43
1:B:544:GLU:OE2	1:B:555:GLN:HG3	2.18	0.43
1:C:588:SER:C	1:C:589:TRP:CD1	2.91	0.43
1:A:523:VAL:CG2	1:A:543:VAL:HG22	2.48	0.43
1:C:549:GLU:N	1:C:549:GLU:OE1	2.51	0.43
1:A:480:LEU:HD11	1:A:601:MET:HE1	1.99	0.43
1:B:547:ILE:HD12	1:B:547:ILE:N	2.33	0.43
1:A:543:VAL:CG1	1:A:556:ALA:HB3	2.45	0.43
1:C:554:ILE:HD12	1:C:830:TYR:CD2	2.53	0.43
1:C:679:LEU:C	1:C:679:LEU:HD23	2.39	0.43
1:A:367:MET:HE2	1:A:372:PHE:HA	2.01	0.43
1:B:464:GLN:NE2	1:B:466:CYS:SG	2.92	0.42
1:D:511:TYR:CE1	1:D:591:CYS:HB2	2.54	0.42
1:B:546:PHE:C	1:B:547:ILE:HD12	2.40	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:1001:ANP:H3'	2:B:1001:ANP:PA	2.60	0.42
1:C:373:HIS:CE1	1:C:617:SER:HA	2.54	0.42
1:D:771:LYS:O	1:D:774:GLN:HB3	2.19	0.42
1:A:464:GLN:O	1:A:488:GLN:HA	2.20	0.42
1:C:574:PHE:CE1	1:C:582:ARG:HB2	2.54	0.42
1:D:779:ILE:O	1:D:780:GLN:CB	2.66	0.42
1:A:461:LYS:HA	1:A:492:THR:HG22	2.02	0.42
1:D:547:ILE:HG12	1:D:601:MET:CE	2.50	0.42
1:B:818:LYS:HB3	1:B:819:PRO:CD	2.50	0.42
1:C:355:MET:SD	1:C:600:ILE:HD11	2.60	0.42
1:C:759:TRP:CZ3	1:C:761:GLU:HA	2.55	0.41
1:D:487:TRP:C	1:D:487:TRP:CD1	2.93	0.41
1:A:799:CYS:O	1:A:801:PRO:HD3	2.21	0.41
1:B:465:TRP:CE3	1:B:488:GLN:HB2	2.55	0.41
1:B:354:GLU:OE2	1:B:673:LYS:NZ	2.52	0.41
1:B:812:LYS:HD2	1:B:817:GLY:O	2.21	0.41
1:C:356:ILE:HA	1:C:356:ILE:HD13	1.83	0.41
1:B:453:ARG:HA	1:B:453:ARG:HD3	1.75	0.41
1:B:433:LYS:C	1:B:434:ILE:HG13	2.40	0.41
1:C:486:LEU:HB2	1:C:593:THR:HG23	2.01	0.41
1:A:716:LEU:HD23	1:A:716:LEU:HA	1.92	0.41
1:B:379:GLN:O	1:B:383:ASP:HB2	2.21	0.41
1:D:373:HIS:HB3	1:D:617:SER:OG	2.21	0.41
1:B:357:GLU:HB3	1:B:366:ILE:HB	2.03	0.40
1:C:746:MET:N	1:C:747:PRO:CD	2.84	0.40
1:D:503:LEU:O	1:D:507:ILE:HG12	2.21	0.40
1:D:805:PRO:HD2	1:D:823:TRP:CD1	2.57	0.40
1:A:660:ASN:OD1	1:A:660:ASN:N	2.48	0.40
1:B:338:LYS:HE2	1:B:549:GLU:OE2	2.22	0.40
1:B:575:GLU:HA	1:B:580:HIS:O	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	468/500 (94%)	454 (97%)	14 (3%)	0	100	100
1	B	462/500 (92%)	445 (96%)	17 (4%)	0	100	100
1	C	463/500 (93%)	448 (97%)	15 (3%)	0	100	100
1	D	462/500 (92%)	448 (97%)	14 (3%)	0	100	100
All	All	1855/2000 (93%)	1795 (97%)	60 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	410/436 (94%)	399 (97%)	11 (3%)	40	67
1	B	396/436 (91%)	392 (99%)	4 (1%)	73	88
1	C	403/436 (92%)	400 (99%)	3 (1%)	81	93
1	D	399/436 (92%)	391 (98%)	8 (2%)	50	75
All	All	1608/1744 (92%)	1582 (98%)	26 (2%)	58	80

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	402	ARG
1	A	471	TRP
1	A	487	TRP
1	A	488	GLN
1	A	543	VAL
1	A	578	GLU
1	A	589	TRP
1	A	593	THR
1	A	614	ARG
1	A	638	LYS

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Mol	Chain	Res	Type
1	A	641	GLU
1	B	471	TRP
1	B	487	TRP
1	B	488	GLN
1	B	589	TRP
1	C	487	TRP
1	C	488	GLN
1	C	589	TRP
1	D	471	TRP
1	D	487	TRP
1	D	488	GLN
1	D	543	VAL
1	D	589	TRP
1	D	593	THR
1	D	662	THR
1	D	741	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	464	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 20 ligands modelled in this entry, 12 are monoatomic - leaving 8 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
2	ANP	B	1001	3	29,33,33	1.06	1 (3%)	31,52,52	0.85	1 (3%)
2	ANP	A	1001	3	29,33,33	1.03	1 (3%)	31,52,52	0.92	1 (3%)
4	87C	D	1004	-	23,24,24	0.91	1 (4%)	24,33,33	2.19	8 (33%)
4	87C	A	1004	-	23,24,24	0.91	1 (4%)	24,33,33	2.27	8 (33%)
2	ANP	D	1001	3	29,33,33	1.02	1 (3%)	31,52,52	1.00	2 (6%)
4	87C	C	1004	-	23,24,24	0.91	1 (4%)	24,33,33	2.05	8 (33%)
4	87C	B	1004	-	23,24,24	1.01	1 (4%)	24,33,33	2.38	8 (33%)
2	ANP	C	1001	3	29,33,33	0.93	1 (3%)	31,52,52	1.05	3 (9%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ANP	B	1001	3	-	6/14/38/38	0/3/3/3
2	ANP	A	1001	3	-	5/14/38/38	0/3/3/3
4	87C	D	1004	-	-	2/8/26/26	1/3/3/3
4	87C	A	1004	-	-	1/8/26/26	1/3/3/3
2	ANP	D	1001	3	-	5/14/38/38	0/3/3/3
4	87C	C	1004	-	-	0/8/26/26	1/3/3/3
4	87C	B	1004	-	-	1/8/26/26	1/3/3/3
2	ANP	C	1001	3	-	5/14/38/38	0/3/3/3

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1001	ANP	O4'-C1'	3.82	1.46	1.41
2	D	1001	ANP	O4'-C1'	3.72	1.46	1.41
2	C	1001	ANP	O4'-C1'	3.59	1.46	1.41
2	A	1001	ANP	O4'-C1'	2.74	1.44	1.41
4	A	1004	87C	C17-C12	-2.62	1.37	1.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	1004	87C	C17-C12	-2.50	1.38	1.44
4	B	1004	87C	C17-C12	-2.42	1.38	1.44
4	D	1004	87C	C17-C12	-2.33	1.38	1.44

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	1004	87C	C07-N08-C17	5.13	121.07	117.35
4	A	1004	87C	N08-C09-N10	-5.10	121.40	126.46
4	B	1004	87C	C07-N08-C17	4.99	120.96	117.35
4	B	1004	87C	N08-C09-N10	-4.81	121.69	126.46
4	B	1004	87C	C02-N03-C04	-4.79	108.63	111.62
4	D	1004	87C	N08-C09-N10	-4.75	121.75	126.46
4	C	1004	87C	N08-C09-N10	-4.72	121.78	126.46
4	A	1004	87C	C07-N08-C17	4.66	120.73	117.35
4	B	1004	87C	C09-N08-C17	-4.54	119.78	123.08
4	D	1004	87C	C09-N08-C17	-4.32	119.94	123.08
4	A	1004	87C	C02-N03-C04	-4.18	109.01	111.62
4	C	1004	87C	C09-N08-C17	-4.13	120.07	123.08
4	A	1004	87C	C09-N08-C17	-4.05	120.13	123.08
4	C	1004	87C	C07-N08-C17	3.88	120.16	117.35
4	B	1004	87C	C12-C11-N10	-3.26	118.94	123.68
4	A	1004	87C	C12-C11-N10	-3.06	119.23	123.68
4	D	1004	87C	C12-C11-N10	-3.01	119.30	123.68
4	C	1004	87C	C12-C11-N10	-2.99	119.34	123.68
4	D	1004	87C	C16-C11-N10	2.95	119.18	114.62
4	C	1004	87C	C02-N03-C04	-2.93	109.80	111.62
4	B	1004	87C	C16-C11-N10	2.92	119.14	114.62
4	C	1004	87C	C16-C11-N10	2.90	119.11	114.62
4	A	1004	87C	C16-C11-N10	2.81	118.97	114.62
4	D	1004	87C	C02-N03-C04	-2.80	109.87	111.62
4	A	1004	87C	O18-C17-C12	-2.65	120.03	125.08
2	A	1001	ANP	O1G-PG-N3B	-2.59	107.96	111.77
2	D	1001	ANP	O1G-PG-N3B	-2.59	107.96	111.77
2	B	1001	ANP	O1G-PG-N3B	-2.57	107.98	111.77
2	C	1001	ANP	O1G-PG-N3B	-2.57	107.99	111.77
2	C	1001	ANP	O1B-PB-N3B	2.46	115.39	111.77
4	B	1004	87C	O18-C17-C12	-2.45	120.41	125.08
4	B	1004	87C	C12-C17-N08	2.44	119.45	115.20
4	A	1004	87C	C12-C17-N08	2.34	119.26	115.20
4	D	1004	87C	C12-C17-N08	2.33	119.26	115.20
4	D	1004	87C	O18-C17-C12	-2.28	120.73	125.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1001	ANP	O3A-PB-N3B	-2.23	100.40	106.59
4	C	1004	87C	C12-C17-N08	2.18	118.99	115.20
4	C	1004	87C	O18-C17-C12	-2.14	121.01	125.08
2	D	1001	ANP	O1B-PB-N3B	2.10	114.87	111.77

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	ANP	PG-N3B-PB-O1B
2	A	1001	ANP	C5'-O5'-PA-O1A
2	B	1001	ANP	PG-N3B-PB-O1B
2	B	1001	ANP	PA-O3A-PB-O1B
2	B	1001	ANP	PA-O3A-PB-O2B
2	B	1001	ANP	C5'-O5'-PA-O2A
2	B	1001	ANP	C5'-O5'-PA-O3A
2	C	1001	ANP	PG-N3B-PB-O1B
2	C	1001	ANP	PA-O3A-PB-O1B
2	C	1001	ANP	C5'-O5'-PA-O1A
2	D	1001	ANP	PG-N3B-PB-O1B
2	D	1001	ANP	C5'-O5'-PA-O1A
4	A	1004	87C	O19-C06-C07-N08
4	D	1004	87C	C20-C04-C05-C06
4	D	1004	87C	N03-C04-C05-C06
2	B	1001	ANP	C4'-C5'-O5'-PA
2	A	1001	ANP	C5'-O5'-PA-O3A
2	A	1001	ANP	C5'-O5'-PA-O2A
2	C	1001	ANP	C5'-O5'-PA-O2A
2	D	1001	ANP	C5'-O5'-PA-O2A
4	B	1004	87C	C20-C04-C05-C06
2	A	1001	ANP	O4'-C4'-C5'-O5'
2	D	1001	ANP	C4'-C5'-O5'-PA
2	C	1001	ANP	C5'-O5'-PA-O3A
2	D	1001	ANP	C5'-O5'-PA-O3A

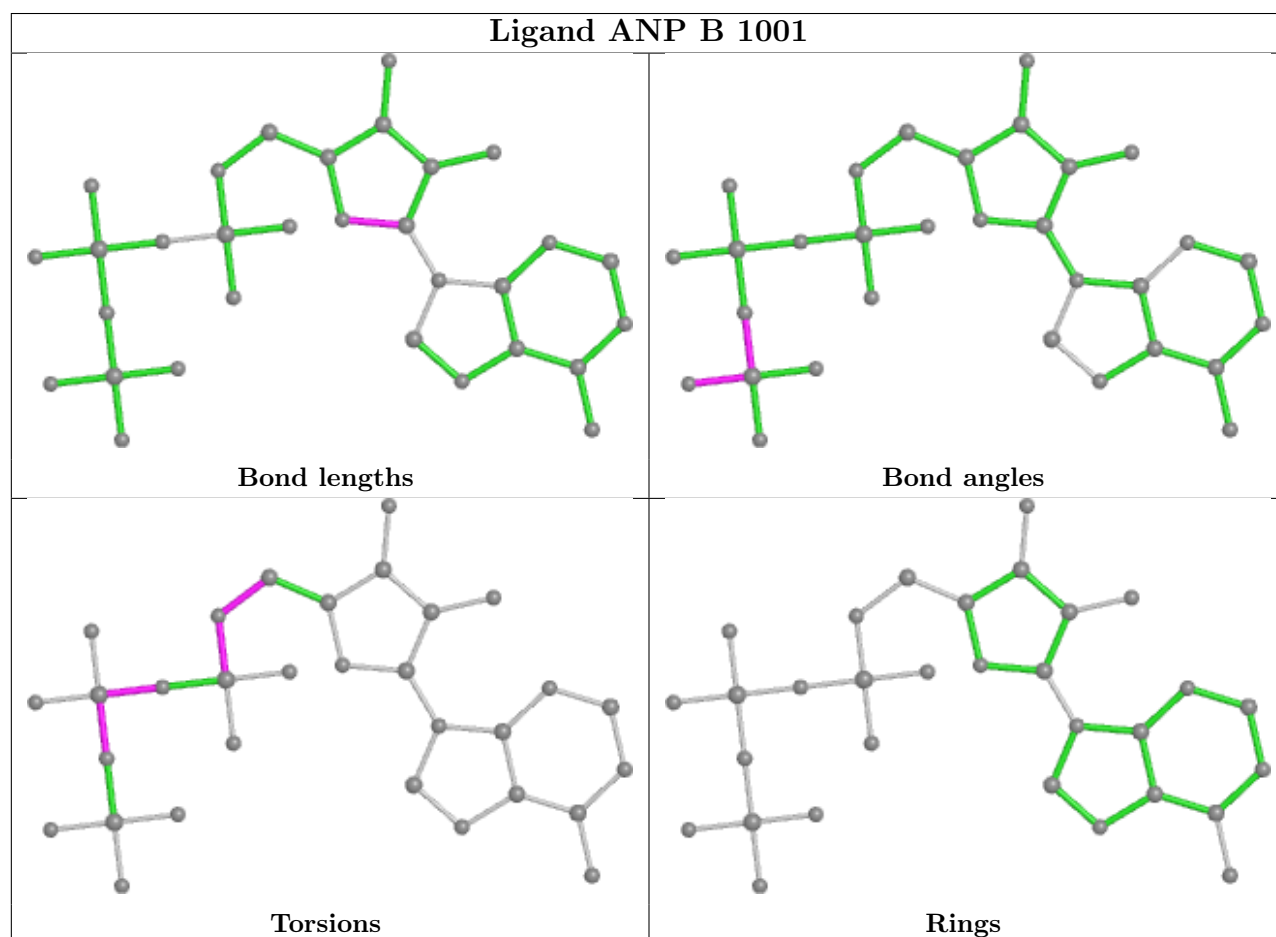
All (4) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	1004	87C	C01-C02-C04-C20-C21-N03
4	C	1004	87C	C01-C02-C04-C20-C21-N03
4	A	1004	87C	C01-C02-C04-C20-C21-N03
4	D	1004	87C	C01-C02-C04-C20-C21-N03

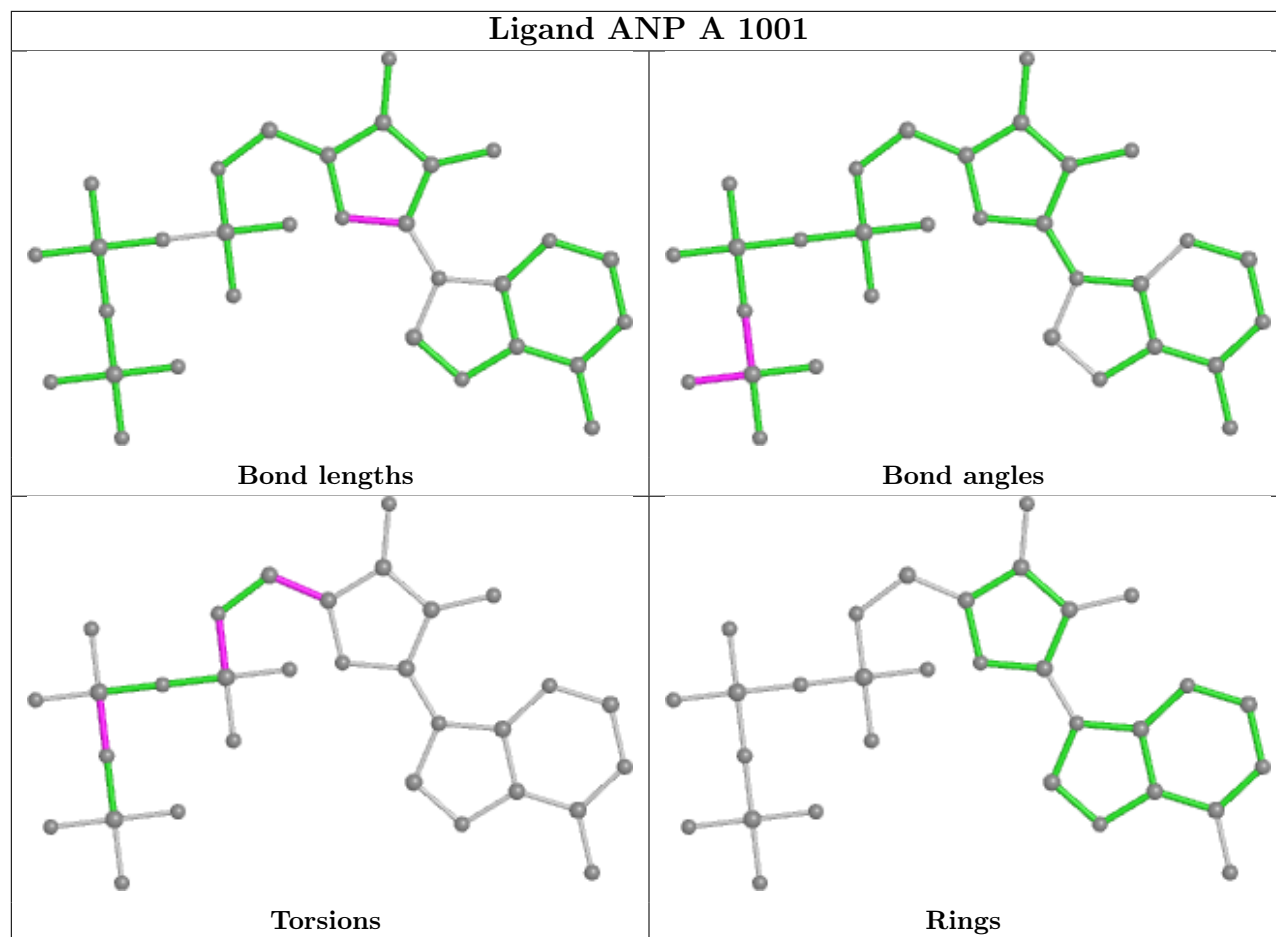
2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1001	ANP	2	0
4	D	1004	87C	1	0

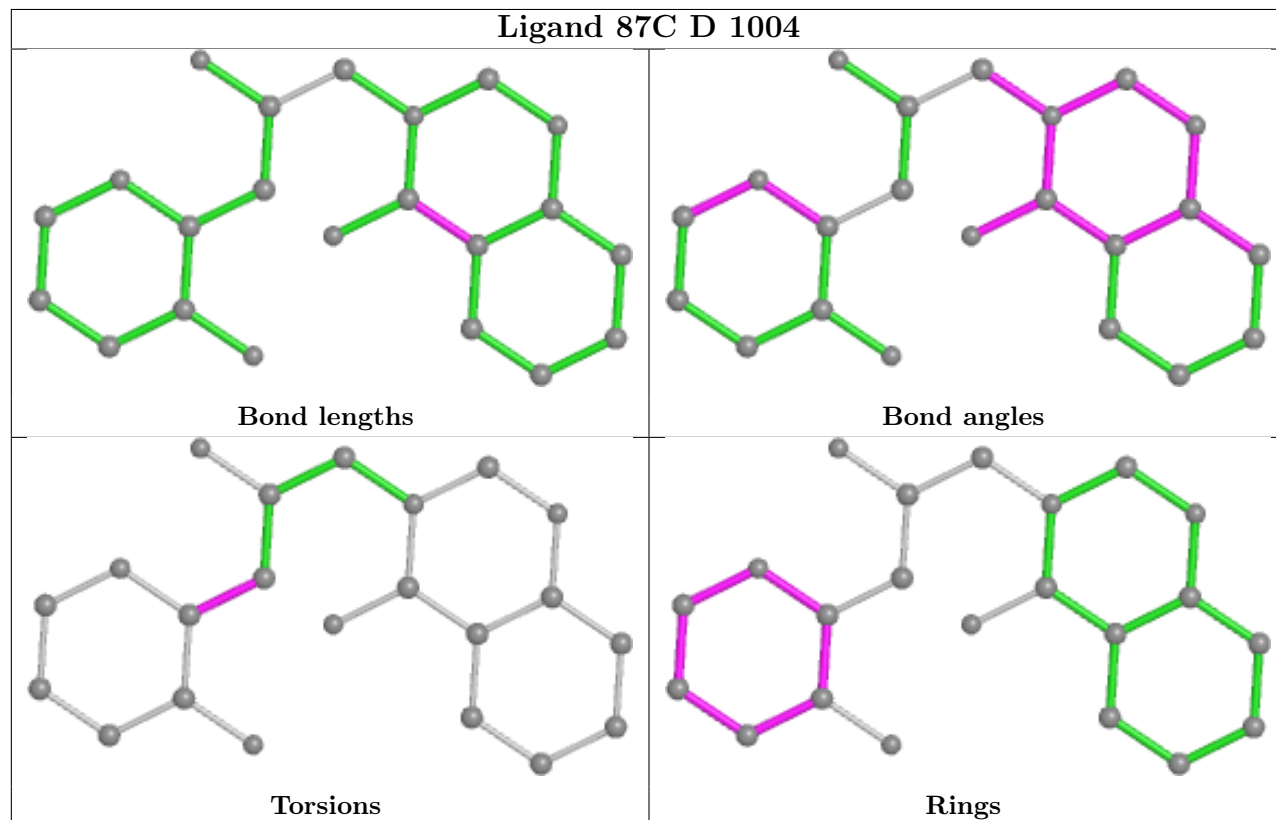
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

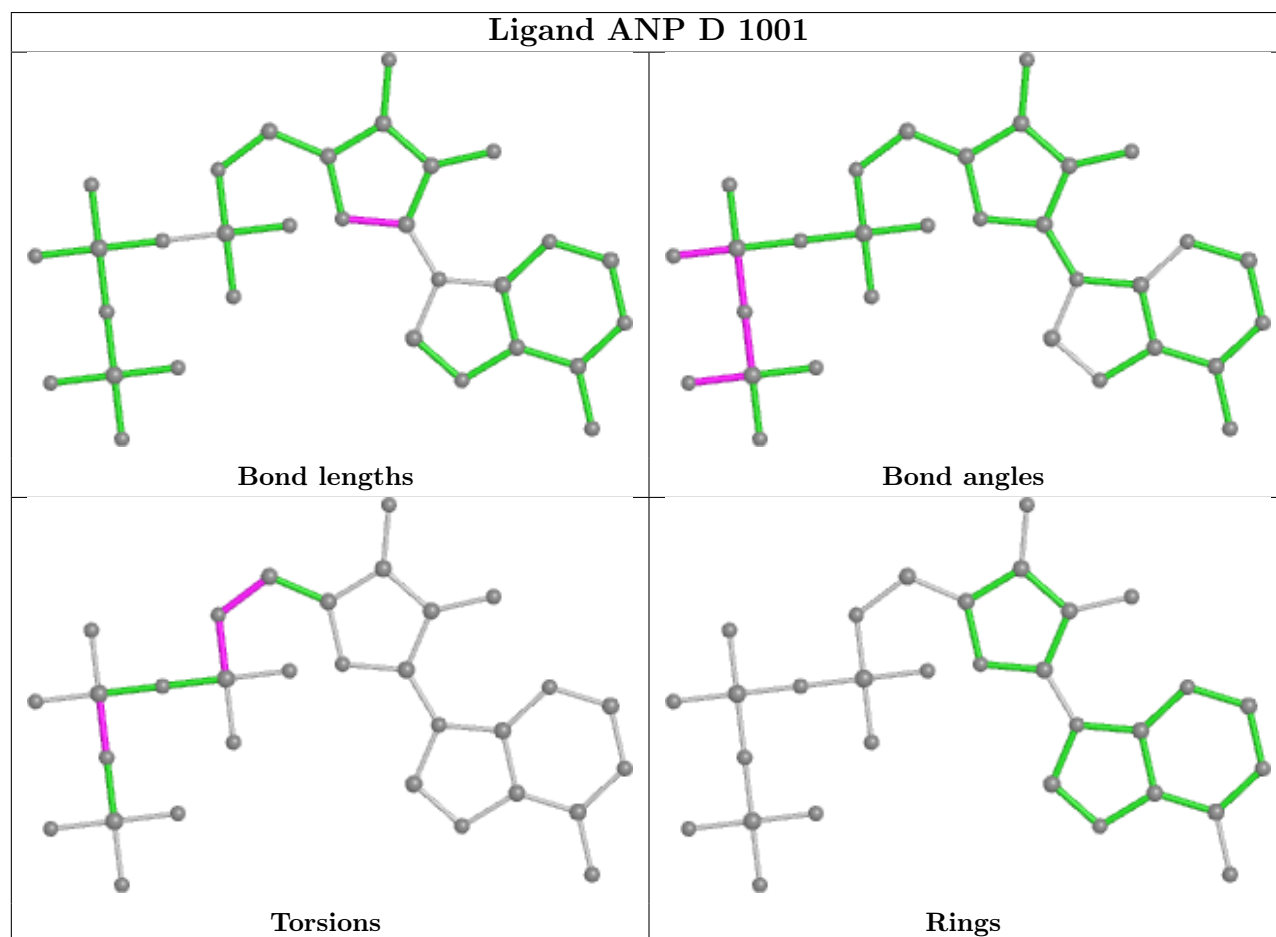
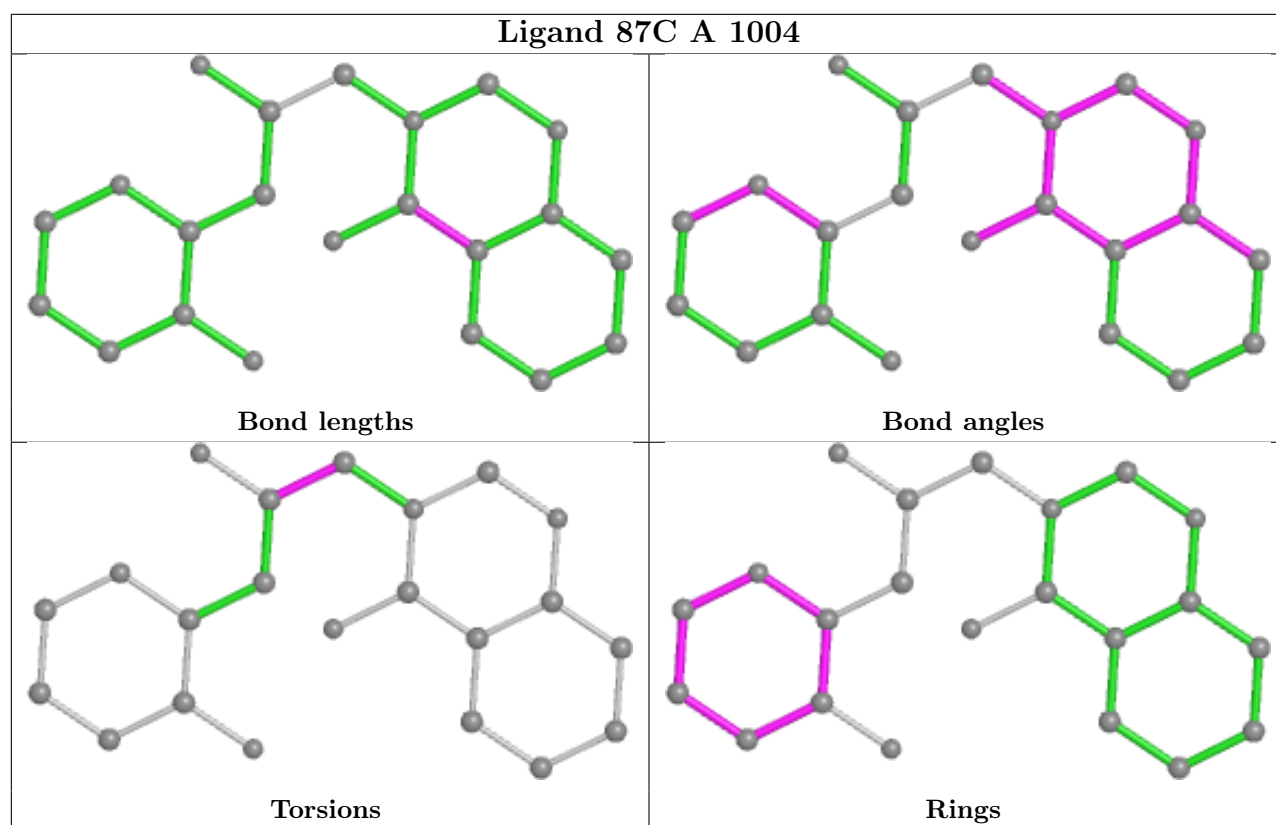


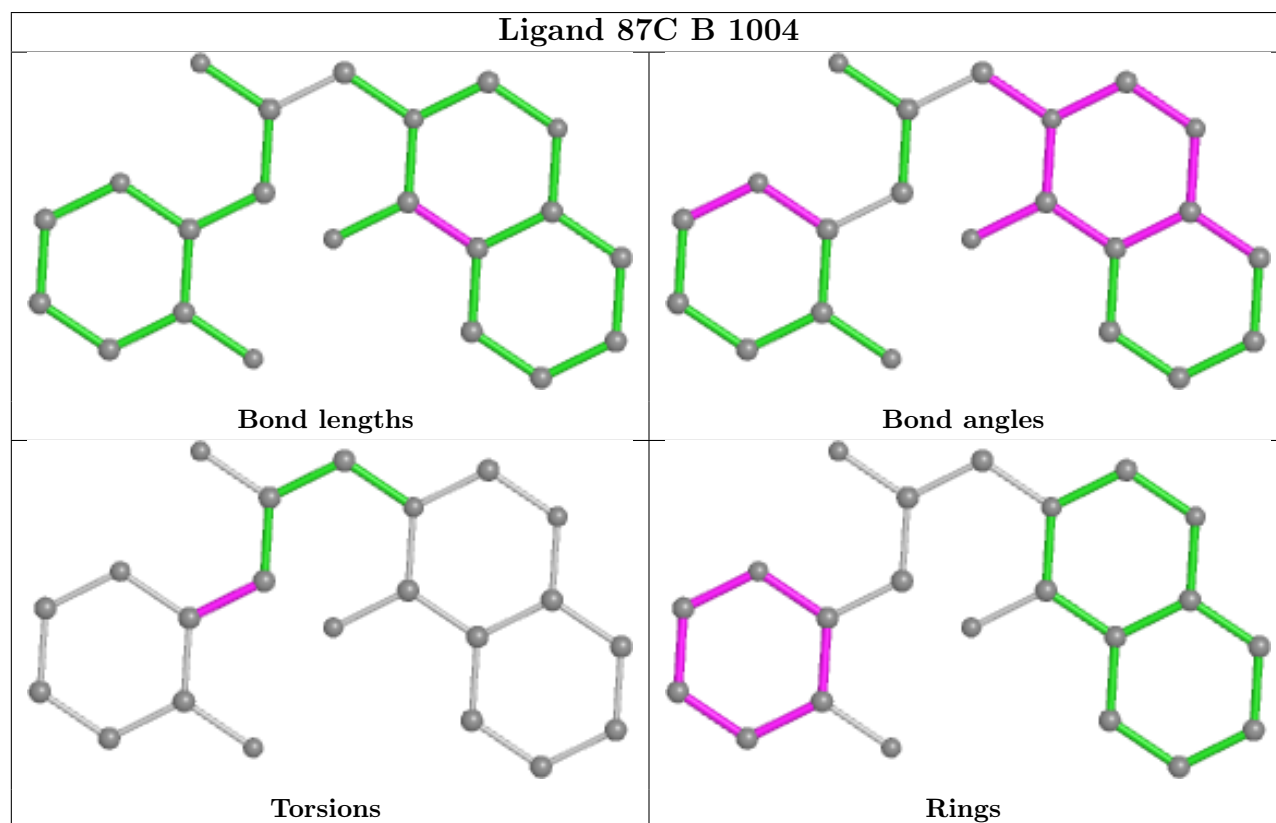
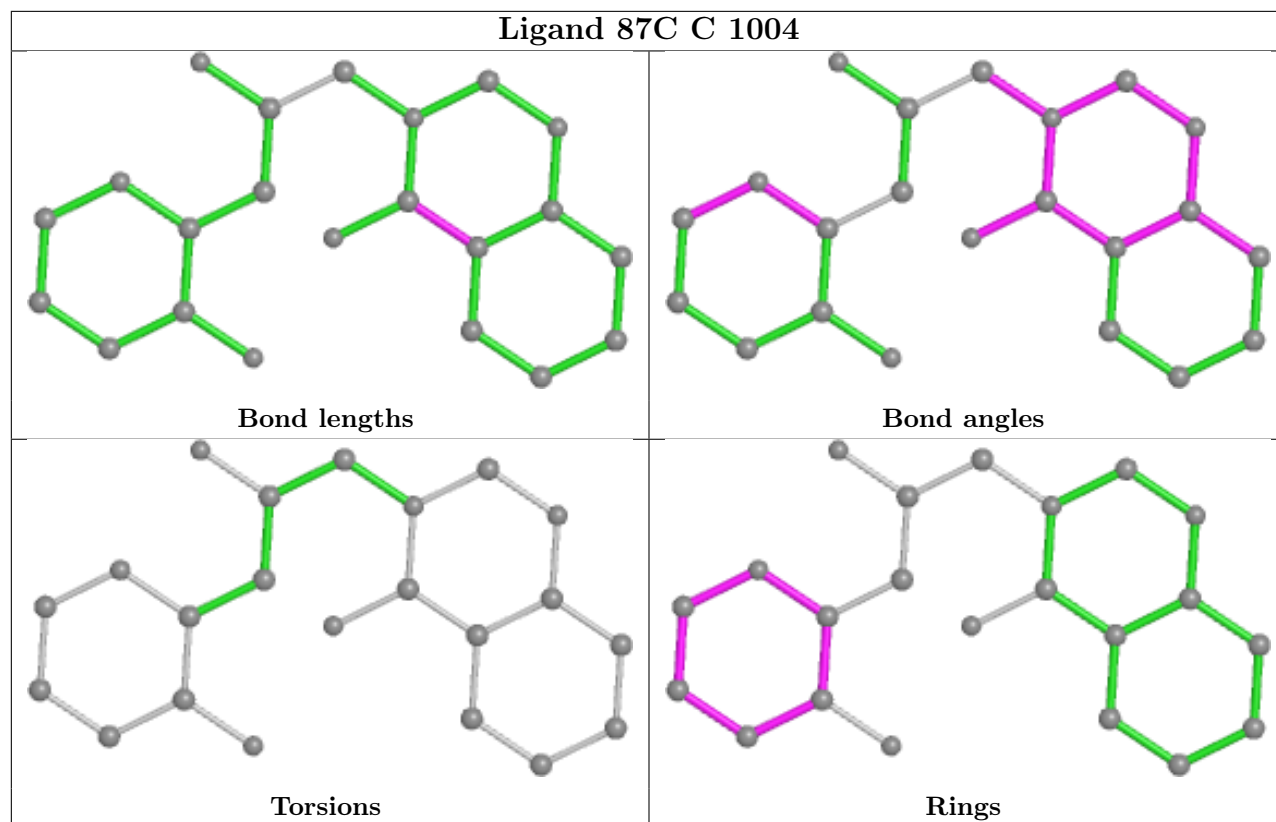
Ligand ANP A 1001

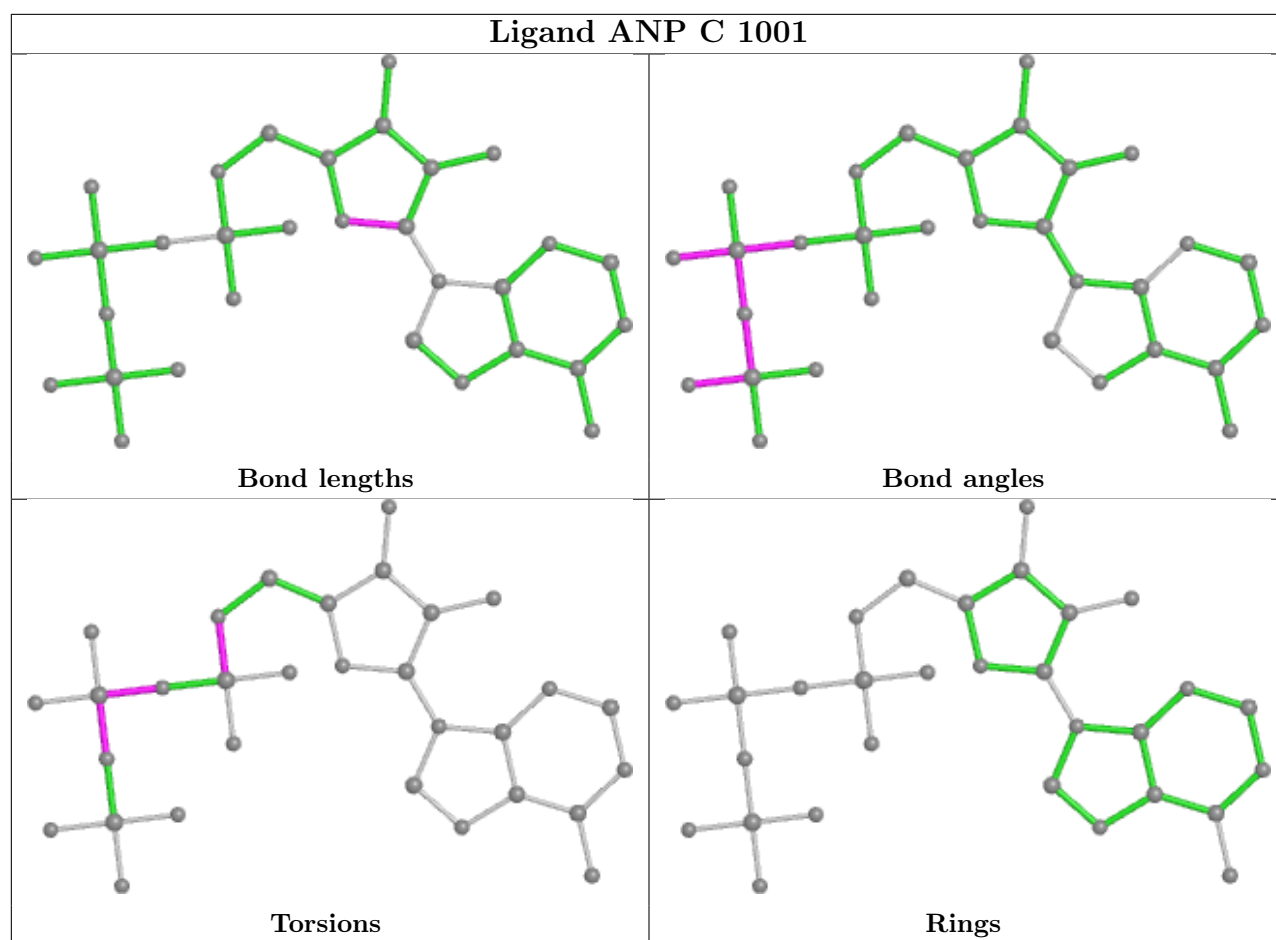


Ligand 87C D 1004









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	476/500 (95%)	-0.33	9 (1%) 66 63	17, 31, 55, 92	1 (0%)
1	B	469/500 (93%)	-0.12	10 (2%) 63 60	19, 37, 63, 96	2 (0%)
1	C	471/500 (94%)	-0.19	10 (2%) 63 60	19, 37, 61, 76	1 (0%)
1	D	472/500 (94%)	-0.10	14 (2%) 52 49	14, 36, 66, 84	2 (0%)
All	All	1888/2000 (94%)	-0.18	43 (2%) 61 58	14, 35, 62, 96	6 (0%)

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	631	ASN	7.3
1	B	408	GLU	4.1
1	D	776	LEU	4.1
1	C	408	GLU	3.9
1	D	793	GLY	3.7
1	D	816	THR	3.5
1	D	743	ASP	3.4
1	D	632	THR	3.2
1	D	408	GLU	3.2
1	A	659	SER	3.2
1	B	578	GLU	3.2
1	A	627	PHE	3.1
1	C	793	GLY	3.1
1	B	333	MET	3.1
1	D	358	TYR	3.1
1	D	456	ARG	3.1
1	C	626	LEU	3.1
1	B	682	GLY	2.9
1	D	779	ILE	2.8
1	D	809	GLU	2.8
1	B	687	ALA	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	427	ASP	2.7
1	A	780	GLN	2.6
1	D	333	MET	2.5
1	C	659	SER	2.5
1	A	456	ARG	2.5
1	C	333	MET	2.5
1	D	427	ASP	2.5
1	D	424	HIS	2.5
1	B	456	ARG	2.5
1	A	632	THR	2.4
1	D	821	LYS	2.4
1	A	333	MET	2.3
1	C	778	GLU	2.3
1	C	456	ARG	2.2
1	B	530	GLU	2.2
1	A	407	LYS	2.2
1	B	635	ILE	2.1
1	C	776	LEU	2.1
1	C	743	ASP	2.1
1	C	407	LYS	2.0
1	B	577	GLU	2.0
1	B	776	LEU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	CL	A	1005	1/1	0.88	0.10	58,58,58,58	0

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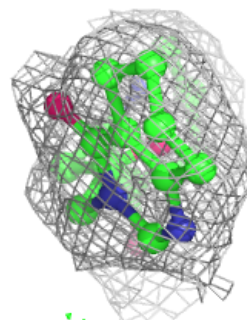
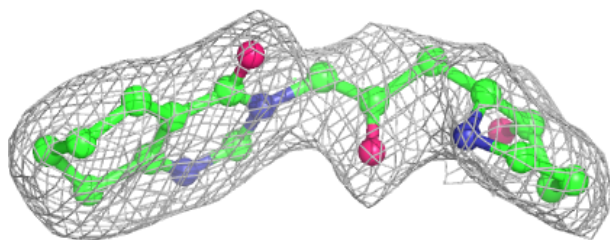
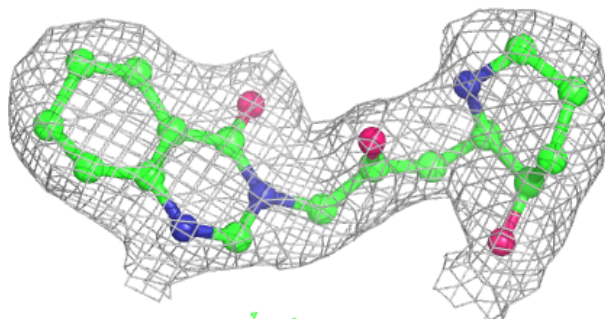
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
5	CL	C	1005	1/1	0.90	0.13	66,66,66,66	0
4	87C	D	1004	22/22	0.92	0.10	23,32,34,35	0
4	87C	C	1004	22/22	0.93	0.09	22,24,25,27	0
5	CL	D	1006	1/1	0.93	0.09	57,57,57,57	0
3	MG	A	1002	1/1	0.94	0.05	24,24,24,24	0
2	ANP	A	1001	31/31	0.94	0.08	18,23,26,28	0
4	87C	A	1004	22/22	0.95	0.08	20,24,30,31	0
5	CL	D	1005	1/1	0.95	0.10	55,55,55,55	0
2	ANP	D	1001	31/31	0.95	0.08	24,27,30,36	0
2	ANP	B	1001	31/31	0.96	0.08	22,25,28,32	0
4	87C	B	1004	22/22	0.96	0.06	24,25,27,32	0
2	ANP	C	1001	31/31	0.97	0.07	21,26,32,39	0
3	MG	B	1002	1/1	0.97	0.04	28,28,28,28	0
3	MG	D	1002	1/1	0.98	0.04	24,24,24,24	0
3	MG	A	1003	1/1	0.98	0.03	30,30,30,30	0
3	MG	C	1003	1/1	0.98	0.08	43,43,43,43	0
3	MG	D	1003	1/1	0.99	0.02	30,30,30,30	0
3	MG	B	1003	1/1	0.99	0.05	32,32,32,32	0
3	MG	C	1002	1/1	0.99	0.04	24,24,24,24	0

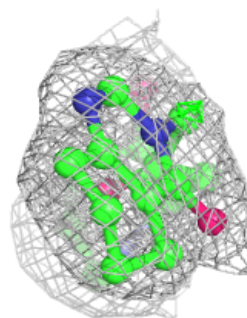
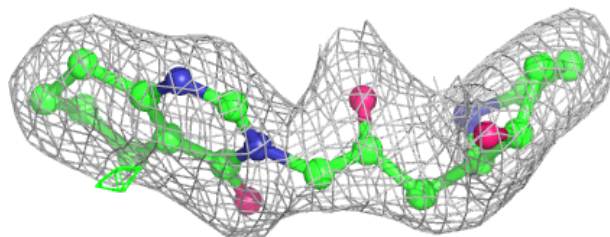
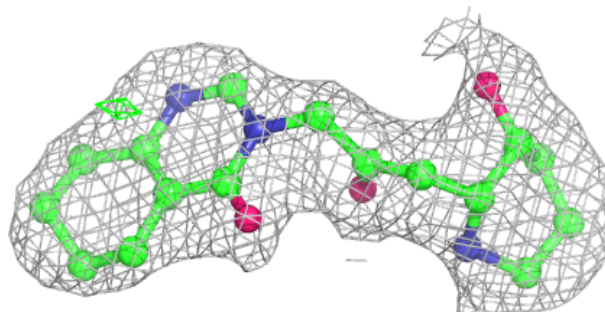
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around 87C D 1004:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

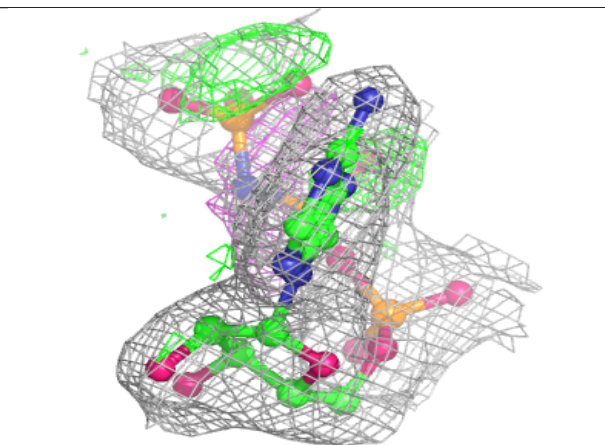
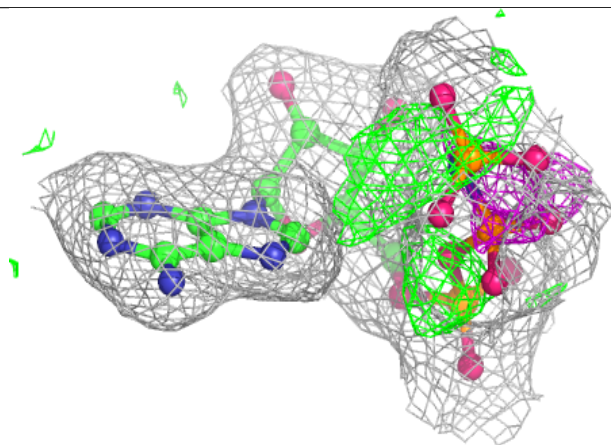
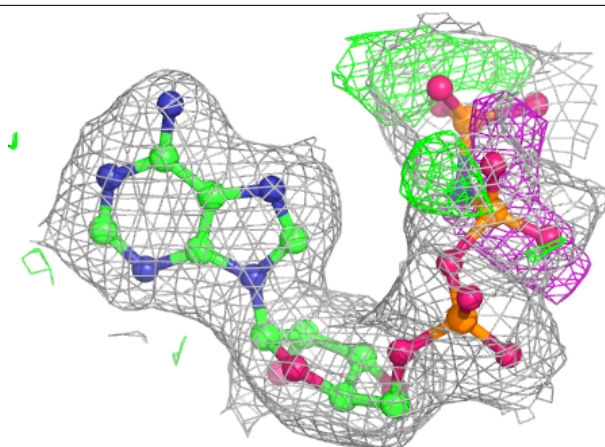
**Electron density around 87C C 1004:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

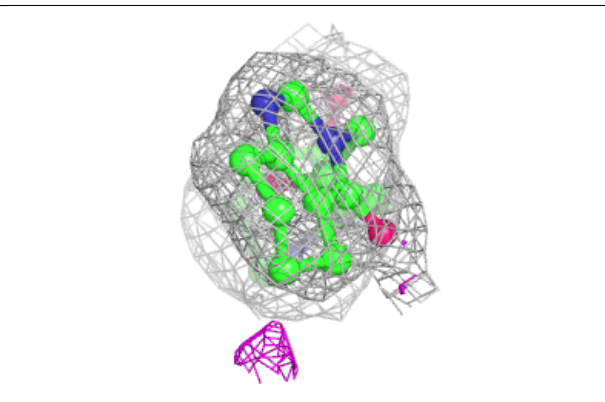
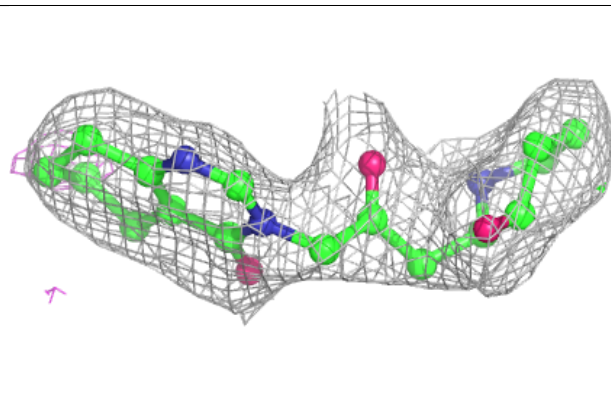
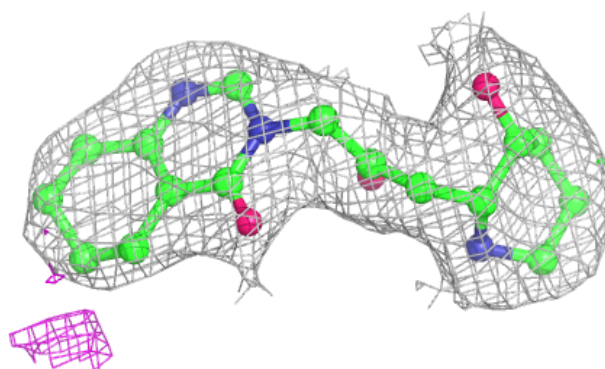


Electron density around ANP A 1001:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

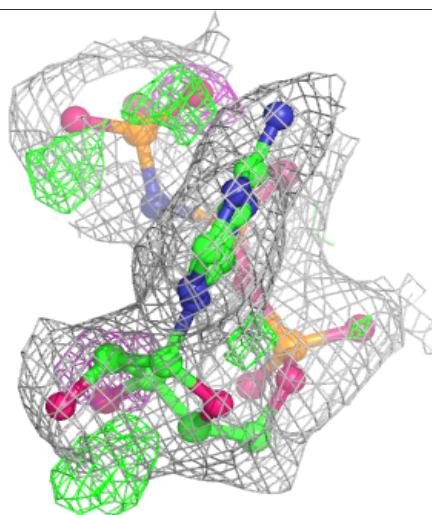
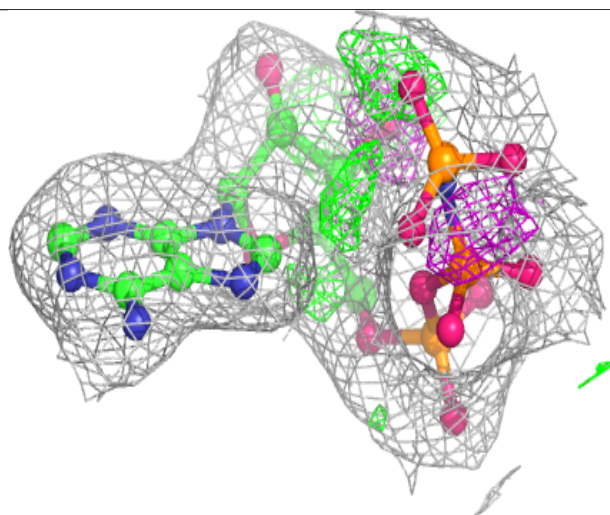
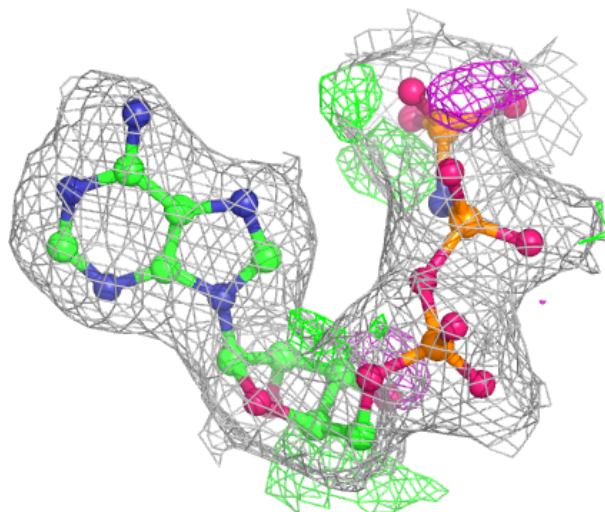
**Electron density around 87C A 1004:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



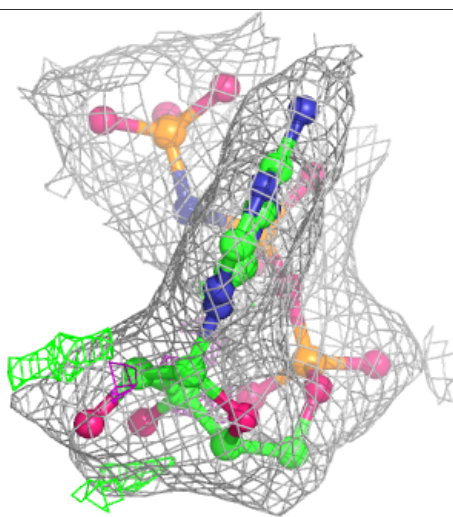
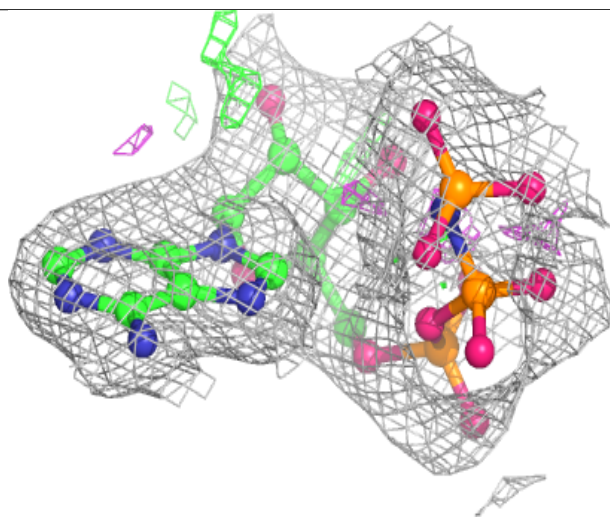
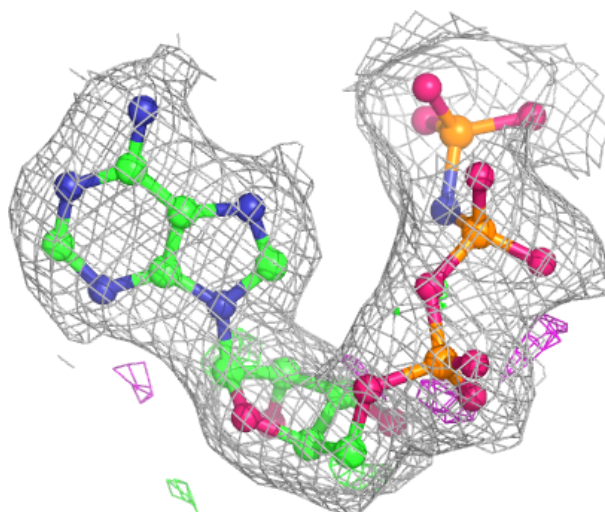
Electron density around ANP D 1001:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



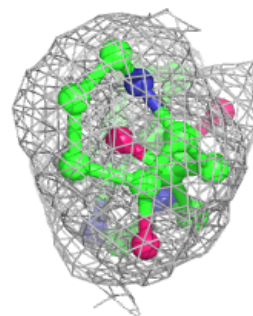
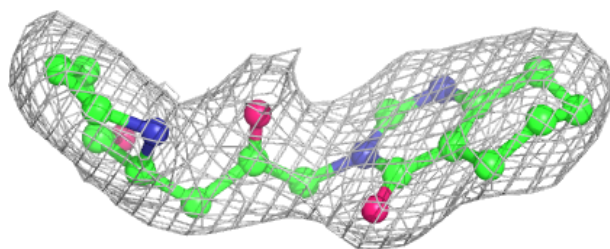
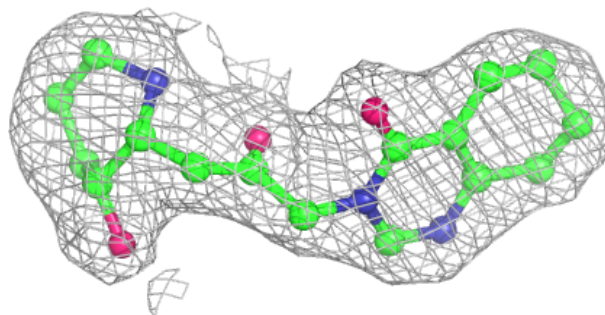
Electron density around ANP B 1001:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



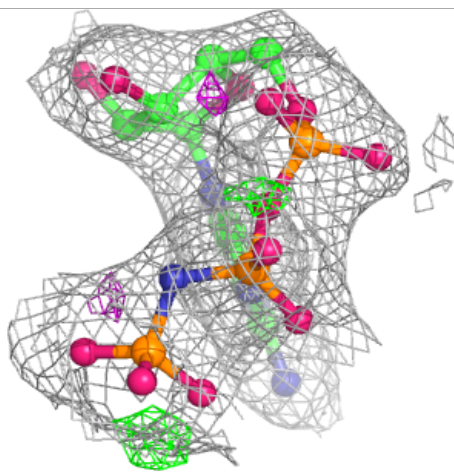
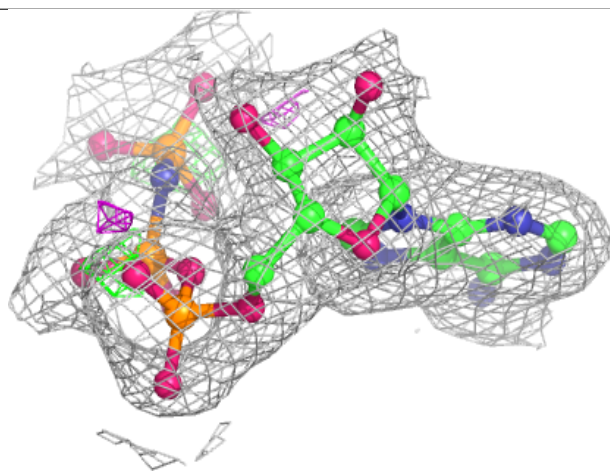
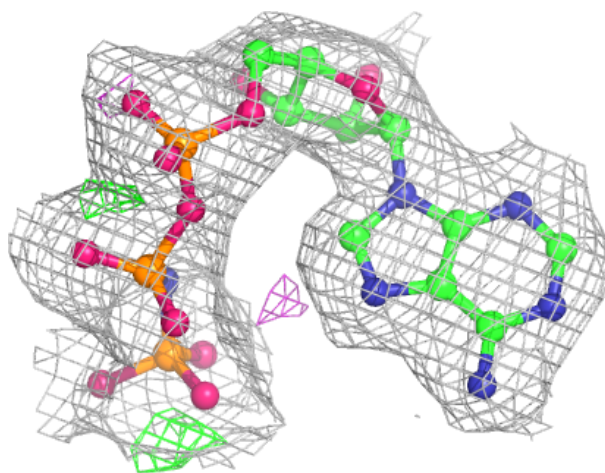
Electron density around 87C B 1004:

$2mF_o - DF_c$ (at 0.7 rmsd) in gray
 $mF_o - DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around ANP C 1001:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.